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STATISTICAL SERVICE OF THE HARVARD UNIVERSITY COMMITTEE ON ECONOMIC RESEARCH

SPECIAL LETTER

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PREVAILING PRICE MALADJUSTMENTS

ONE of the greatest obstacles standing in the way of a revival of business activity is the prevailing maladjustment among the prices of important commodities. In certain lines liquidation has proceeded until prices are near or even below pre-war levels, while in other lines prices are still twice as high as they were in 1913. The contrast between agricultural products or raw materials and various manufactured goods is the most important case in point. Most of the chief farm products have undergone drastic, in fact undue, liquidation, and some of them are selling below 1913 prices. On the other hand, manufactured products, especially at retail, have not experienced a corresponding decline. This situation works obvious hardship upon the farmers, and curtails seriously their purchasing power. Furthermore, inasmuch as agricultural products and raw materials provide the income of about one-half of the population, the curtailment of purchases by this element has been a large factor in causing the prevailing industrial stagnation. Whether the restoration of normal relations between the prices of the two classes of products is to be brought about by a rise of the prices of raw materials or a further decline in the prices of manufactured goods, is a question that lies beyond the scope of the present discussion.

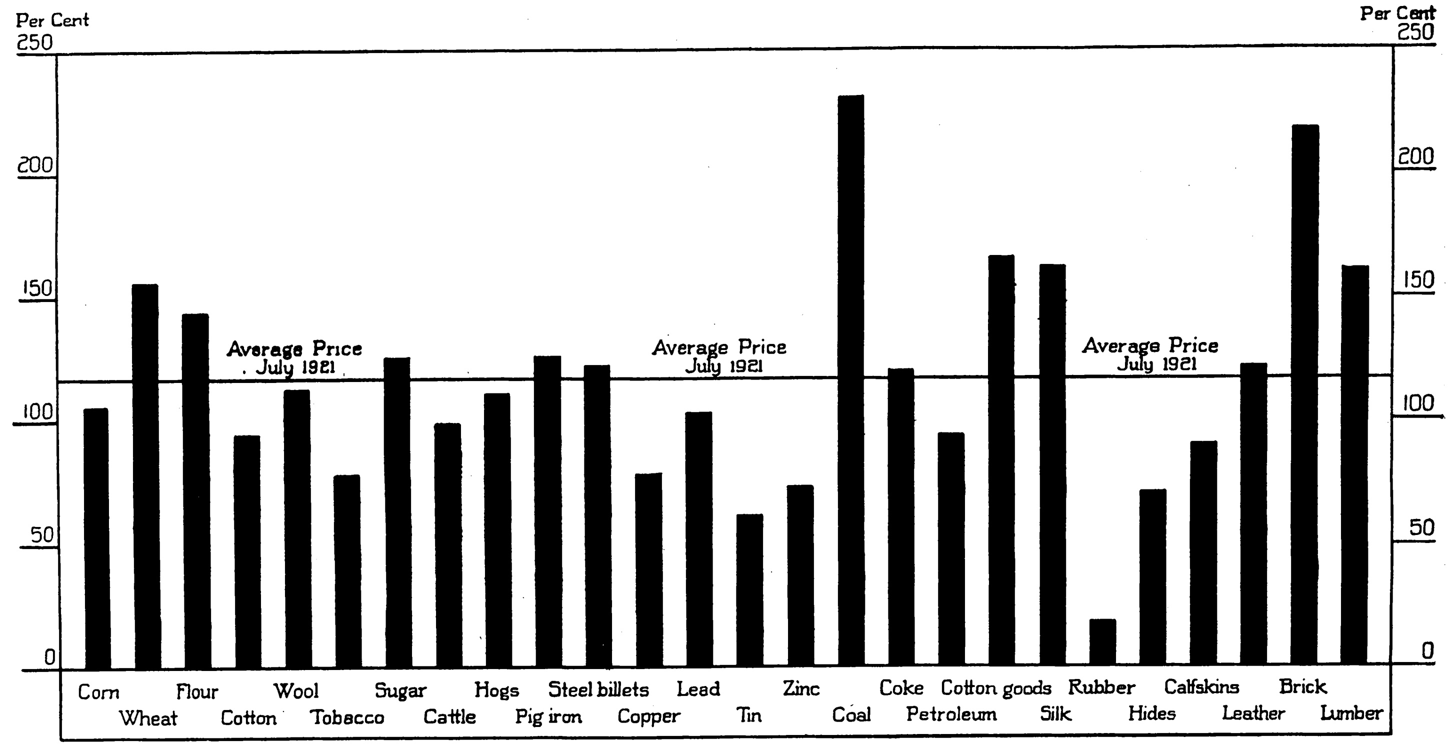
The maladjustment between the prices of farm products and raw materials and the prices of manufactured goods is the most significant instance of price maladjustment, but the whole net-work of exchange relations is shot through with similar dislocations. Wherever these dislocations exist, it means hardship for the individual concerns and industries which have liquidated more drastically than others; and because of economic interdependence these hardships extend throughout the whole industrial structure.

The present discussion deals with this maladjustment of the prices of individual commodities. In order to avoid misconception it should be understood that we are not here concerned, except incidentally, with the general level of prices, but are comparing the price level of one commodity with the price levels of other commodities.

A graphic presentation of the situation in July 1921 is given in the following diagram.

RAW MATERIALS AND AGRICULTURAL PRODUCTS CHIEFLY CONSIDERED

At the outset it should be noted that of the 26 important commodities which have been selected for this study the great majority are either raw materials or agricultural products; only a very few are finished manufactured goods. If a larger number of the latter class were considered, the dislocation of individual commodity price levels would undoubtedly appear



EXPLANATION: The height of each column on the diagram represents the relative price in July 1921 of the designated commodity, the average price of the commodity during the year 1913 being taken as the base 100. Thus, corn sold in 1913 for 59 cents per bushel, but in July 1921 the price was 62½ cents, which is 106 per cent of the 1913 figure. Hence on the diagram the height of the column representing the price of corn is 106 units. The index numbers for all commodities may be found in the table at the end of the discussion. The horizontal line designated "average price, July 1921" is 117 units above the origin, 117 being the average of the 26 index numbers.

greater than it is in the case of the 26 commodities here considered. On this point the index number of the United States Bureau of Labor Statistics may be cited. The Bureau's index number is based on the average price of more than 300 commodities, including those here treated and many others, some of which are finished products. This index number in June 1921 was 148 whereas the index number for the commodities included in this study was 119 in the same month. Adding to the list of commodities here used commodities whose price is higher would therefore enlarge the deviations and emphasize the price maladjustment.

1913 as Normal

For purposes of comparison the price relations among the commodities in the year 1913 are assumed to be normal, and deviations from those relations are regarded as maladjustments. To illustrate: In 1913 a ton of steel billets sold for $27. and a pound of leather sold for 45 cents (see table given below). To preserve in July 1921 this "normal" exchange ratio (60 to 1) the price of steel billets and the price of leather must have undergone the same percentage change from their 1913 levels. Actually we find such to be the case. The price of each was 22 per cent higher in July 1921 than in 1913. At the more recent date steel billets at $33. per ton and leather at 55 cents per pound were exchanging at the 1913 or normal ratio of 60 to 1. Therefore between these two commodities there was no price maladjustment in July 1921. This situation is shown graphically in the diagram by the equal height of the columns representing steel billets and leather.

But let us make another comparison, one more nearly typical of the general situation — steel billets and copper. We find that the 1913 prices were: steel billets, $27. per ton; and copper, 15¾ cents per pound. By July 1921 steel billets were 22 per cent above the 1913 price, while by that month copper had declined so that its price was only 79 per cent of the 1913 figure. At 1913 prices the exchange ratio was 171 to 1, but in July 1921 the ratio was 266 to 1. In other words, maladjustment existed in the exchange relation between steel billets and copper. This is also shown on the diagram by the difference in height of the column for steel billets and the column for copper.

If then the preservation of normal exchange ratios among the commodities depends upon the equality of percentage change during the period of changing prices, the normal situation would exist in July 1921 only if the price of every commodity had risen by the same percentage above the price for 1913, that is, by seventeen per cent. Therefore the line in the chart marked "average price, July 1921," which represents the average price increase of all the commodities above the level for 1913, may be taken as a basis for measuring maladjustment.

Two objections to the methods used suggest themselves. In the first place, a different period as a basis of comparison may be urged, the years 1911–13 for example. However, 1913 has been used because it is the latest year not affected by the war, and because investigation has shown, moreover, that substantially the same results are obtained by using either the single year 1913 or the longer period.

In the second place, it may be objected that to designate any period several years past as a "normal" period for comparison with the present is unjustifiable, because the price relations obtaining in 1913, or in fact almost any period before the war, are not normal in 1921. This objection of course has weight. It is unlikely that the situation in 1913 will be reproduced exactly. However, as will be shown in a later paragraph, the trend during the past year has been toward the 1913 exchange ratios. In the light of this, and inasmuch as an approximate and not a rigid comparison is contemplated, it seems quite justifiable to regard deviations from 1913 relations as maladjustments.

Features of the Maladjustments

An examination of the diagram given above shows clearly that very marked deviations from normal exchange relations of the selected commodities do exist. Every deviation above or below the "average" line means that the particular commodity is by so much "out of line" in comparison with the others.

Corn, cotton, wool, tobacco, cattle, hogs, the non-ferrous metals, petroleum, rubber, hides, and calf-skins, are all selling at a disadvantage, i. e. below the general average. Furthermore, many of these are selling actually below their respective 1913 levels. On the other hand, wheat, flour, sugar, iron and steel, coal, cotton goods, silk, leather, bricks, and lumber are selling at prices above the average level.

This simple classification into two groups — the commodities selling above the average level and those selling below it — does not reveal the extent of divergence in particular cases. Certain commodities are far above the normal level; others are far below, while still others show very slight deviation from it.

Of the extreme cases, coal and brick are conspicuously high above the normal level, while rubber is very far below it. The dislocation in the exchange relation between coal and rubber is the most pronounced instance of maladjustment found among the commodities considered. Other commodities which show great deviation are lumber, cotton goods, and silk — above the general level; and hides, tobacco, copper, tin, and zinc — below it. If more manufactured goods were included in the list, there would be many more cases of prices above the general level. Cotton goods, the only highly manufactured product on the list, have been liquidated more than most other manufactures, and at the present time are probably as far liquidated as enhanced labor costs and higher transportation charges permit.

On the other hand, quite a number of commodities are selling at prices only slightly out of harmony with normal price relations. Sugar, pig iron, steel billets, coke, and sole leather are but very little above the general level; and corn, wool, and hogs are but very little below it.

Some further features of the situation may be noted. Wheat stands out as a prominent exception in the group of agricultural products. In general, such products have been selling at a decided disadvantage, but the price of wheat in July 1921 was somewhat above the general level. It is true that the price of wheat was lower some time ago, in April to be exact, than it was in July; but this is also true of other farm products, and so may not be assigned as the explanation of the exceptional position of wheat.

Sugar is a commodity which in 1920 reached an extraordinary high point, its peak price being actually more than 500 per cent above the 1913 level. However, liquidation had proceeded to such lengths by July 1921 that in that month the price of sugar was in almost complete harmony with the general level.

The same may be said of coke, which in 1920 rose to a point more than 600 per cent above its 1913 price.

The contrast between the price levels of coal and coke in July is striking. Coke was substantially at the general average, but coal, out of which coke is made, was at a higher relative level than any other commodity here considered. Bituminous coal was the extreme instance among important commodities in regard to relative price peaks in 1920, reaching a point more than 1000 per cent above its 1913 level; and so it was perhaps to be expected that the subsequent liquidation, which began quite late, would not carry its price as near the general level as the prices of other commodities have been carried.

Although liquidation in the steel industry did not begin until comparatively late, the prices of pig iron and steel billets had by July 1921 been brought into substantial agreement with other commodity prices. This was accomplished with price reductions of a less spectacular nature than took place in some other lines, because iron and steel prices in 1920 were not especially high when compared with many other commodities. The highest price levels in iron and steel were reached during the year 1917.

The non-ferrous metals as a group are selling far below the normal level; and with the exception of lead, they are all individually below their respective 1913 prices.

The textile industry was one of the first manufacturing industries to begin liquidation in 1920, and is also one which has definitely passed the low point of activity. By the opening of 1921 the price of important cotton goods products had been more than cut in two as compared with peak prices. The peak prices had been very high, however; brown sheetings, standard prints, and staple ginghams all sold in 1920 more than 300 per cent above their 1913 prices. Consequently, although very drastic reductions have been made, current prices are still relatively high as compared with the other commodities here considered. But this fact is not to be wondered at, inasmuch as the comparison here made is chiefly with raw materials and agricultural products whose price levels are below the price levels of most manufactured products.

A glance at the diagram indicates the difficult position in which the dealers in hides and calfskins find themselves; in exchange for other products these commodities are at a decided disadvantage. Their prices in July 1921 were much lower than the normal prices which should obtain as compared with other commodities, and furthermore were below their respective 1913 levels. But even this situation represents an improvement, for the prices of hides and calfskins were still lower in April 1921 than in July.

In the diagram the height of the columns for brick and lumber bears out the view that the failure to adjust the prices of building materials has been one of the drawbacks to business revival. Income received on the basis of the price levels of most of the commodities represented on the diagram cannot profitably be spent in building operations while the prices of these materials remain at such high levels.

PROGRESS TOWARD READJUSTMENT NOTED

In order to ascertain whether or not progress has been made toward a better adjustment of price levels, statistical measurement has been made of the situation in June 1920, December 1920, and June 1921, as well as in July 1921. To determine the extent of dislocation at each of these times the so-called "mean deviation" from the normal situation was computed. The normal exchange situation on a given date is represented by the average price level of all the commodities at such date; that is, if normal relationships between commodities had been maintained, each commodity would have advanced in price by the same percentage as the average for the group. For each of the four months mentioned above the average price level is indicated by the following figures (average price in 1913 = 100):

June	1920	280
December	1920	161
June	1921	119
July	1921	117

The computation of the mean deviations may be illustrated as follows. The normal price relations in July 1921 are represented by the average 117. Comparing this figure with the index number for corn, which is 106, we secure the deviation −11. Comparing the other 25 index numbers in like manner with the average 117 we have a list of 26 deviations, some plus (+) and some minus (−). To secure the mean deviation the method is simply to add the 26 deviations, disregarding the plus and minus signs, and to divide this total by 26. However, for purposes of comparison of one month with another it is preferable to express the mean deviation as a percentage of the average from which the deviations were computed — in this case as a percentage of 117. When all these computations have been made we have for July 1921 a mean deviation of 29.5%. Making the same computations from index numbers of prices on the other dates mentioned above we reach the following results:

		Mean Deviation
June	1920	44.4%
December	1920	38.1%
June	1921	30.1%
July	1921	29.5%

These figures show that from June 1920 to July 1921 there has been a marked trend toward exchange relations of 1913. The progress in price readjustment, measured by the decline in the mean deviation, was pronounced during the second half of 1920, but was even more pronounced during the first half of 1921. This whole period was characterized by drastic price reductions. At the peak of prices, there were also various maladjustments; but with these we are not now concerned. Whether the degree of maladjustment at the peak was greater or less than that which has existed during the process of liquidation is a question of much theoretical and practical importance, but one which cannot be considered in this letter.

A complete correspondence with the 1913, or normal, situation would be indicated by a mean deviation 0; consequently the deviation 29.5% in July 1921 means that the price situation is still greatly out of adjustment, and this in spite of the fact that the extent of maladjustment has been materially lessened during the past year.

However, it should not be assumed that 29.5% measures *exactly* the extent of present maladjustment. Such an assumption is equivalent to the assertion that 1913 price relations are *entirely* normal for 1921, an assertion which is hardly justifiable. In other words, the existing maladjustment is probably less (possibly more) than 29.5%. Accepting this limitation — and it applies to other years as well as to 1921 — the percentages derived seem to indicate unmistakably two conclusions: that, as far as these twenty-six commodities are concerned, there has been during the past year a very definite trend toward the price relations of 1913; and that the maladjustment in July 1921, although materially less than a year ago, was still large.

It is this trend back to normal which is the encouraging feature in the situation. Not only is the trend noticeable over the period of a year, but from June to July 1921 progress in readjustment is recorded.

The table presented below gives a description of each commodity considered in this study, the 1913 average price, the July 1921 price, and the index number of the July price. The quotations have been taken from the *Commerce Monthly* published by the National Bank of Commerce in New York, *Dun's Review*, *Bradstreet's*, and the *Shoe and Leather Reporter*.

COMPARISON OF WHOLESALE PRICES OF 26 COMMODITIES IN JULY 1921 WITH PRICES FOR THE YEAR 1913

Commodity	Unit	Price in 1913	Price in July 1921	Index No. for July 1921 (Price in 1913 = 100)
Corn, No. 2 mixed, Chicago	bu.	$ .59	$.625	106
Wheat, No. 1 northern spring, Chicago	bu.	.90	1.4075	156
Flour, straight winter	bbl.	4.52	6.50	144
Cotton, middling upland, spot, New Orleans	lb.	.127	.1188	94
Wool, clean basis, Boston, Ohio fine delaine and Ohio ¼ blood	lb.	.55	.62	113
Tobacco, Burley Red, com., sht., Louisville	lb.	.09	.07	78
Sugar, 96° centrifugal, duty paid, New York	lb.	.035	.0438	125
Cattle, fair to choice native steers, Chicago	100 lbs.	8.18	8.10	99
Hogs, good merchantable, pigs and rough stock excluded, Chicago	100 lbs.	8.49	9.40	111
Pig Iron, basic, Valley furnace	gr. ton	15.11	19.00	126
Steel Billets, open hearth, Pittsburgh	gr. ton	27.00	33.00	122
Copper, electrolytic, early delivery, New York	lb.	.1575	.1238	79
Lead, pig, early delivery, New York	lb.	.044	.0455	103
Tin, New York	lb.	.449	.2775	62
Zinc, prime western, early delivery, St. Louis	lb.	.058	.0425	73
Coal, bituminous, run of mine, f. o .b. mine, Fairmont, W. Va.	gr. ton	1.04	2.40	231
Coke, furnace, Connellsville, at oven, prompt shipment	net ton	2.38	2.85	120
Petroleum, crude, at well, Pennsylvania	bbl.	2.39	2.25	94
Cotton Goods: brown sheetings 4 yd., standard prints, staple ginghams, New York	yd.	.061	.101	166
Silk, Shinshiu No. 1, New York	lb.	3.65	5.90	162
Rubber, Para, upriver fine, New York	lb.	.93	.165	18
Hides, green salted packers', No. 1 heavy native steers, Chicago	lb.	.1825	.13	71
Calfskins, No. 1, Chicago	lb.	.20	.18	90
Leather, scoured oak backs, medium weight, New York	lb.	.45	.55	122
Brick, Hudson R., common, New York	1000	6.88	15.00	218
Lumber, hemlock, Pennsylvania, base pr.	1000 ft.	24.04	38.80	161

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